Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	
Use of Spectrum Bands Above 24 GHz For Mobile Radio Services	)	GN Docket No. 14-177
	)	
Establishing a More Flexible Framework to Facilitate Satellite Operations in the 27.5-28.35 GHz and 37.5-40 GHz Bands	)	IB Docket No. 15-256
	)	
Petition for Rulemaking of the Fixed Wireless Communications Coalition to Create Service Rules for the 42-43.5 GHz Band	)	RM-11664
	)	
Amendment of Parts 1, 22, 24, 27, 74, 80, 90, 95 and 101 To Establish Uniform License Renewal, Discontinuance of Operation, and Geographic Partitioning and Spectrum Disaggregation Rules and Policies for Certain Wireless Radio Services	)	WT Docket No. 10-112
	)	
Allocation and Designation of Spectrum for Fixed-Satellite Services in the 37.5-38.5 GHz, 40.5-41.5 GHz and 48.2-50.2 GHz Frequency Bands; Allocation of Spectrum to Upgrade Fixed and Mobile Allocations in the 40.5-42.5 GHz Frequency Band; Allocation of Spectrum in the 46.9-47.0 GHz Frequency Band for Wireless Services; and Allocation of Spectrum in the 37.0-38.0 GHz and 40.0-40.5 GHz for Government Operations	)	IB Docket No. 97-95

OPPOSITION OF VIASAT, INC.

Christopher J. Murphy
Associate General Counsel
Regulatory Affairs
VIASAT, INC.
6155 El Camino Real
Carlsbad, CA 92009

John P. Janka
Elizabeth R. Park
LATHAM & WATKINS LLP
555 Eleventh Street, N.W.
Suite 1000
Washington, DC 20004

Counsel for ViaSat, Inc.

January 31, 2017

Summary

ViaSat urges the Commission to dismiss the reconsideration petitions of EchoStar/Inmarsat and SES/O3b, and also to dismiss Boeing's request to fundamentally change the way the Commission calculates the impact of a proposed earth station on nearby UMFU operations. These petitions are solutions in search of a problem.

There is no reason to overturn and rewrite the rules for sharing between satellite and terrestrial mobile wireless services in the 27.5-28.35 GHz and 37.5-40 GHz band segments. It is possible to design, site, and operate an earth station that satisfies the 0.1 percent population coverage threshold adopted in the *Order*, even in rural areas. And it is possible to deploy such an earth station near fiber. Even in circumstances where that may not be the case, the Commission has provided a number of other ways to authorize earth stations.

The satellite petitioners claim that the rules do not serve their intended purpose and that the Commission really meant to *encourage* future earth station deployment *in rural areas*, and to *discourage* deployment *in urban areas*. That argument is specious. The unambiguous intent of the *Order* is to enable the deployment of earth stations throughout the nation, *including urban areas*. The Commission made that intent clear in rejecting one of the proposals made again on reconsideration, explaining that adopting that proposal would provide less predictability about the locations of future earth stations, and also would limit the ability to deploy earth stations near population centers.

Claims that the record does not support the decision, and that the Commission acted arbitrarily or did not engage in reasoned analysis, simply do not bear scrutiny. The record is more than adequate. The satellite petitioners and the SIA responded on the record to an *ex parte* proposal that they claim gave rise to the primary sharing rule they contest. SIA made a counter-

proposal “in the interest of developing a concrete solution to sharing with UMFU operators” that it described as “similar to the approach proposed.”

Moreover, complaints about the potential application of the rules are based on theoretical models that do not take into account either actual technical parameters of an earth station, or real-world factors like terrain that determine how much of the local area (if any) the operation of the earth station actually might affect. Other concerns about the application of the rules can be handled by the International Bureau under its delegated authority; they simply do not require reconsideration of the *Order*.

Table of Contents

Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	
Use of Spectrum Bands Above 24 GHz For Mobile Radio Services	)	GN Docket No. 14-177
	)	
Establishing a More Flexible Framework to Facilitate Satellite Operations in the 27.5-28.35 GHz and 37.5-40 GHz Bands	)	IB Docket No. 15-256
	)	
Petition for Rulemaking of the Fixed Wireless Communications Coalition to Create Service Rules for the 42-43.5 GHz Band	)	RM-11664
Amendment of Parts 1, 22, 24, 27, 74, 80, 90, 95 and 101 To Establish Uniform License Renewal, Discontinuance of Operation, and Geographic Partitioning and Spectrum Disaggregation Rules and Policies for Certain Wireless Radio Services	)	WT Docket No. 10-112
	)	
Allocation and Designation of Spectrum for Fixed-Satellite Services in the 37.5-38.5 GHz, 40.5-41.5 GHz and 48.2-50.2 GHz Frequency Bands; Allocation of Spectrum to Upgrade Fixed and Mobile Allocations in the 40.5-42.5 GHz Frequency Band; Allocation of Spectrum in the 46.9-47.0 GHz Frequency Band for Wireless Services; and Allocation of Spectrum in the 37.0-38.0 GHz and 40.0-40.5 GHz for Government Operations	)	IB Docket No. 97-95

OPPOSITION OF VIASAT, INC.

ViaSat, Inc. ("ViaSat") opposes the petitions for reconsideration filed by certain satellite operators that seek wholesale revisions to the spectrum sharing framework adopted in the July 2016 *Spectrum Frontiers Order*.[1] Specifically, ViaSat opposes the Petitions for Reconsideration of (i) EchoStar Satellite Operating Corporation, Hughes Network Systems, LLC (together, "EchoStar"), and Inmarsat, Inc. ("Inmarsat"),[2] and (ii) SES Americom, Inc. ("SES") and O3b

---

1 *Use of Spectrum Bands Above 24 GHz for Mobile Radio Services*, Report and Order, 31 FCC Rcd 8014 (2016) ("*Spectrum Frontiers Order*" or "*Order*").

2 Joint Petition for Reconsideration of EchoStar Satellite Operating Corporation, Hughes Network Systems, LLC and Inmarsat, Inc., GN Docket No. 14-177, *et al*. (Dec. 14, 2016) ("EchoStar/Inmarsat Petition").

Limited ("O3b")[3] (collectively, EchoStar/Inmarsat and SES/O3b are referred to as the "Satellite Petitioners").[4] ViaSat opposes the Petition for Reconsideration of the Boeing Company ("Boeing)[5] to the extent Boeing seeks to change how the Commission calculates the impact of a proposed earth station protection zone on nearby terrestrial wireless operations.

I. INTRODUCTION

The Satellite Petitioners seek to both (i) overturn the sharing framework for satellite and terrestrial mobile wireless services in the shared 27.5-28.35 GHz and 37.5-40 GHz band segments, and (ii) substantially rewrite the adopted rules for new earth station deployment.

The sharing framework adopted identifies a few different options by which an earth station may be authorized in spectrum shared with terrestrial licensees. The Satellite Petitioners claim that it will not be possible for them to use one particular option for authorizing an earth station. That option applies when an earth station is designed and sited in a manner that limits its impact on nearby UMFU operations, with the impact measured by (i) the portion of nearby population actually covered by a specified amount of RF energy emitted by the earth station, and (ii) whether that specified amount of energy actually covers a nearby major event venue, arterial

---

3 Petition for Reconsideration of SES Americom, Inc. and O3b Limited, GN Docket No. 14-177, *et al*. (Dec. 14, 2016) ("SES/O3b Petition").

4 ViaSat does not object to the proposals by SES/O3b and EchoStar/Inmarsat to develop a database of actually-deployed UMFU facilities. *See* SES/O3b Petition at 17-18; EchoStar/Inmarsat Petition at 21-22. As ViaSat previously explained, having a database would facilitate more effective shared use of both the 28 GHz band and the 39 GHz band, including use on an opportunistic basis. *See, e.g.,* ViaSat *Ex Parte,* GN Docket No. 14-177, *et al*., at 8-9 (July 7, 2016) ("ViaSat July 7 *Ex Parte*") (recommending a database containing relevant information regarding actual UMFU deployment); Comments of ViaSat, Inc., Further Notice of Proposed Rulemaking, GN Docket No. 14-177 *et al.*, at 19-20, Ex. A (Sept. 30, 2016).

5 Petition for Reconsideration, The Boeing Company, at 23-24, GN Docket No. 14-177, *et al.* (Dec. 14, 2016) ("Boeing Petition").

street, interstate, U.S. highway, urban mass transit route, passenger railroad, or cruise ship port (the "0.1 Percent Rule").[6] They assert that the 0.1 Percent Rule will "largely preclude"[7] future earth station deployment, but do not acknowledge the other ways the Commission expressly provided to authorize earth stations where the 0.1 Percent Rule may not apply.

The Satellite Petitioners also allege that the 0.1 Percent Rule does not achieve what they describe as the Commission's goal of *encouraging* future earth station deployment *in rural areas*, and *discouraging* deployment *in urban areas*.[8] EchoStar and Inmarsat assert that enabling urban earth station deployment under the 0.1 Percent Rule creates a "perverse" incentive to deploy in urban areas, and "undermine[s] the objectives the Commission hoped to achieve in this proceeding."[9] Boeing makes similar claims,[10] seeking to substantially modify the 0.1 Percent Rule, and claiming that the Commission really intended "to encourage satellite system operators to locate earth stations in rural and remote areas,"[11] but failed to write rules to that end.

As detailed below, these claims are based on a demonstrably false premise and a misapplication of the 0.1 Percent Rule. The Commission expressly adopted that rule to enable the deployment of earth stations in a manner that affects "a small percentage (or even none) of

---

6 *Spectrum Frontiers Order* at Appendix A, § 25.136(a)(4) (to be codified at 47 C.F.R. § 25.136(a)(4)).

7 EchoStar/Inmarsat Petition at 9.

8 SES/O3b Petition at 7 ("keeping FSS away from more densely populated areas was ostensibly a primary goal of siting restrictions"); *see also id* at 9, 11-13.

9 EchoStar/Inmarsat Petition at 17 ("Perversely, therefore, the rule would create an incentive to locate new earth stations within, rather than well outside, the areas that are expected to be more attractive for terrestrial mobile systems.").

10 Boeing Petition at 23-24.

11 *Id.* at 24.

the population,"[12] regardless whether the affected population is in an urban, ex-urban, suburban, or rural area. Notably, the Commission *rejected a prior proposal from EchoStar and AT&T that was designed to exclude earth station deployment in urban areas,*[13] because that proposal "provided less predictability regarding the locations of future earth stations, and it would have limited the ability of FSS to deploy near population centers."[14] Rather than being "perverse" (as EchoStar and Inmarsat claim),[15] enabling earth station deployment in urban areas is *precisely* what the Commission intended.

Moreover, depending on actual technical performance and interference mitigation, it is actually possible for the operation of an earth station to affect only a small percentage of the nearby area, regardless where it is located. For similar reasons, the adopted rules are actually designed to facilitate the deployment of an earth station near fiber.[16] And even in cases where fiber has to be extended to a planned earth station site, by facilitating the deployment of about 11,000 earth stations across the nation, the framework in the *Spectrum Frontiers Order* also helps achieve the Commission's goal of expanding fiber deployment.

The Satellite Petitioners' complaints about the application of the 0.1 Percent Rule are based on theoretical models that do not take into account either (i) the actual technical

---

12 *Spectrum Frontiers Order* at ¶ 60.

13 *See* AT&T and EchoStar *Ex Parte* Letter, GN Docket No. 14-177, *et al*., at Ex. 2 (Apr. 6, 2016) ("AT&T/EchoStar *Ex Parte*") (proposing to "limit deployment of future individually-licensed FSS earth stations to outside 'urban core' areas").

14 *Spectrum Frontiers Order* at ¶ 60.

15 EchoStar/Inmarsat Petition at 17.

16 *Cf.* SES/O3b Petition at 15 (claiming that "in a large portion of the nation, fiber links may be unavailable at earth station sites permitted under the Commission's rules."); EchoStar/Inmarsat Petition at 9 (the sharing rules "largely preclude FSS earth stations from reasonable access to fiber and other vital infrastructure").

parameters of the earth station in question, or (ii) real-world factors like terrain that determine how much of the local area the operation of the earth station actually would affect.

Overturning the sharing framework and rewriting the rules as the Satellite Petitioners and Boeing propose also are unnecessary because satisfying the 0.1 Percent Rule is not the only way to authorize and deploy earth stations where they wish. To the contrary, the Commission expressly provided a number of other ways to do so, all of which remain available. The "preclusive effect" the Satellite Petitioners and Boeing describe just does not exist.

II. THE COMMISSION CHOSE TO FACILITATE EARTH STATION DEPLOYMENT ACROSS THE NATION—INCLUDING URBAN AREAS

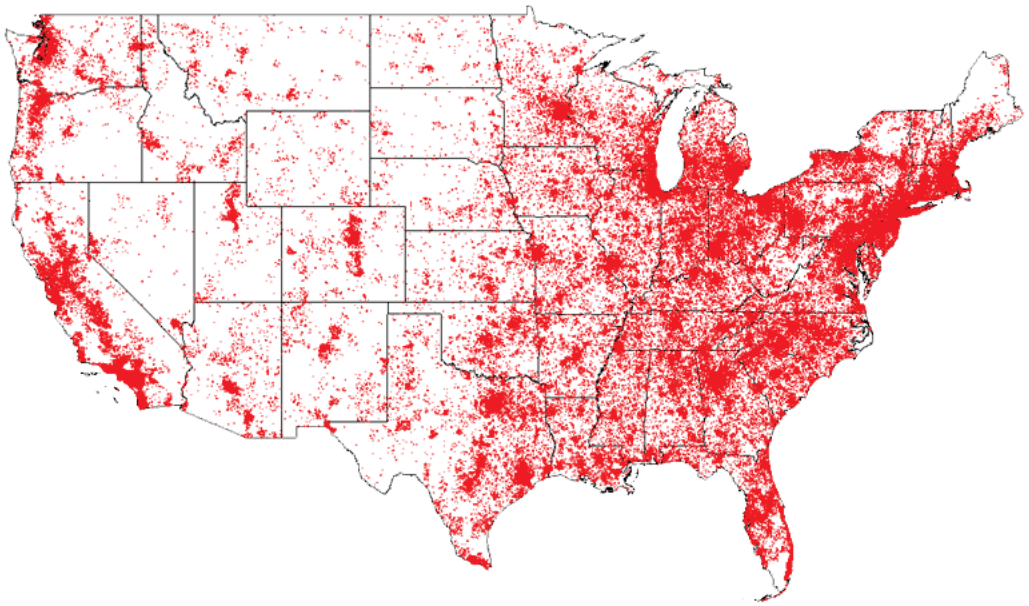
Throughout this proceeding, ViaSat emphasized that existing and next-generation satellite broadband networks must be able to locate earth stations across the nation, and that it is particularly important to be able to locate earth stations in urban and other populated areas.[17]

ViaSat's satellite broadband service relies upon a network of earth stations deployed throughout the United States that communicate with its spacecraft in the Ka band. This ground network consists of user terminals located at customer premises; mobile and transportable terminals; earth stations that aggregate traffic and interconnect with the Internet backbone and other critical terrestrial networks ("A&I Gateways"); and facilities to control the spacecraft. These earth stations are distributed across the United States—they are not primarily located in remote or rural areas. As ViaSat explained during the course of this proceeding, most of its customers are located in or near populated areas, as illustrated in the figure below.[18]

---

17 *See, e.g.,* Comments of ViaSat, Inc., GN Docket No. 14-177, *et al.*, at 4 (Jan. 28, 2016) ("ViaSat Comments"); Reply Comments of ViaSat, Inc., GN Docket No. 14-177, *et al.*, at 10 (Feb. 26, 2016) ("ViaSat Reply Comments").

18 *See, e.g.,* ViaSat Comments at 2-3; ViaSat Reply Comments at 10; Comments of ViaSat, Inc., Notice of Inquiry, GN Docket No. 14-177, RM-11664, at 4-5 (Jan. 15, 2015).



Most of ViaSat's A&I Gateways are located close to customers and connections to the Internet backbone, which are often in more populated areas.[19] A satellite network's capacity and throughput are improved by siting the earth stations that provide connectivity to the Internet near fiber, including in and around urban and other populated areas[20] where high-quality fiber connectivity is readily available at reasonable cost.

For these reasons, ViaSat urged the Commission to adopt rules to accommodate and protect the deployment of an even greater number of essential A&I Gateways that will be deployed in the future—and not just in rural and remote areas. ViaSat emphasized that such facilities will in fact have to be located in urban areas where end users and fiber facilities are located.[21] For instance, the essential earth station facilities for the ViaSat-2 satellite, which is scheduled for launch in the next few months, are located in metropolitan areas such as Albuquerque, Columbus, Portland, Denver, San Diego, Houston, Raleigh, Tucson, Charlotte,

---

19 ViaSat Comments at 4.

20 *See, e.g.*, Comments of Avanti Communications Group plc, GN Docket No. 14-177, *et al.*, at 9 (Jan. 27, 2016) (gateway facilities will be deployed in populated areas).

21 ViaSat Comments at 4.

Oklahoma City, Atlanta, Omaha, Nashville, Indianapolis, Las Vegas, Dallas, Salt Lake City, Minneapolis, Milwaukee, Memphis, Birmingham, San Jose, Kansas City, St. Louis, Detroit, Pittsburgh, and Boston.[22]

Significantly, the Commission acknowledged this need and adopted a sharing framework that affords the ability to locate earth stations near population centers, and it expressly rejected proposals to relegate earth station deployment to rural areas. Early on in this proceeding, AT&T and EchoStar advocated precluding earth station deployment in a large number of "urban core" areas that they would have designated exclusively for Upper Microwave Flexible Use ("UMFU") services.[23] ViaSat opposed the proposal because excluding all earth station deployment in urban cores was not supported by the satellite industry and was unnecessarily restrictive.[24] Wireless carriers opposed the proposal because it did not preclude earth station deployment in a large enough zone around urban areas, or in enough urban areas.[25] The Commission rejected this proposal in its entirety, finding that "it would have provided less predictability regarding the locations of future earth stations, and it would have limited the ability of FSS to deploy near population centers even if the deployment affected a small percentage (or even none) of the

---

22 *See* Public Notice, *Satellite Communications Services Information re: Actions Taken*, Rept. No. SES-01923, at 4-24 (rel. Jan 25, 2017).

23 AT&T/EchoStar *Ex Parte* at Ex. 2 (proposing to "limit deployment of future individually-licensed FSS earth stations to outside 'urban core' areas").

24 *See* ViaSat, Notice of *Ex Parte* Presentation, GN Docket No. 14-177, *et al.*, at 3-4 (Apr. 21, 2016) ("ViaSat April 21 *Ex Parte*"); ViaSat, Notice of *Ex Parte* Presentation, GN Docket No. 14-177, *et al*., at 2 (Apr. 12, 2016).

25 *See, e.g.*, Nextlink Wireless, LLC, Notice of *Ex Parte* Presentation, GN Docket No. 14-177, *et al*., at 3 (May 25, 2016); T-Mobile, Notice of *Ex Parte* Presentation, GN Docket No. 14-177, *et al*., at 2 (May 27, 2016); CTIA *Ex Parte* Letter, GN Docket No. 14-177, *et al*., at 3 (May 20, 2016) (proposing to exclude earth stations in the top 150 MSAs).

population."[26] In stark contrast to what AT&T and EchoStar proposed, the sharing framework the Commission adopted enables earth station deployment in urban areas and near other population centers.

Satellite operators have been moving forward based on the sharing framework and rules adopted in the *Spectrum Frontiers Order* almost seven months ago. Any uncertainty with respect to the issues resolved last summer could disrupt the current construction of, and investment in, new satellite broadband networks. As detailed below, there simply is no need for such disruption. In fact, the International Bureau has the ability, as the Commission expressly provided, to address specific factual circumstances in how it implements the rules.[27] It is critical that the Commission not create a cloud of uncertainty by revisiting the adopted framework, as the Satellite Petitioners and Boeing would have the Commission do.

III. THE ADOPTED SPECTRUM SHARING FRAMEWORK RESPONDS TO CONCERNS RAISED DURING THE PROCEEDING

In addition to claiming that the sharing framework and the 0.1 Percent Rule do not actually achieve the Commission's stated goals, EchoStar and Inmarsat claim that the record does not support the decision and the Commission did not engage in reasoned analysis.[28] Boeing

---

26 *Spectrum Frontiers Order* at ¶ 60. EchoStar and Inmarsat make the specious argument that the AT&T/Echo proposal "would have provided more predictability by precluding earth station deployment" near population centers. EchoStar/Inmarsat Petition at 19. The Commission clearly did not agree. By EchoStar/Inmarsat's logic, precluding earth stations in rural areas also would provide more certainty. But neither approach would meet the needs that the Commission sought to accommodate: encouraging intensive use of the band by both UMFU and satellite, including in and around population centers.

27 *See infra* Section VI; *Spectrum Frontiers Order* at ¶ 54 n.120 (directing International Bureau to issue a public notice seeking comment on implementation of the new rules).

28 *See* EchoStar/Inmarsat Petition at i, 8, 16.

and SES/O3b claim that the Commission acted "arbitrarily."[29] SES/O3b also claim the Commission acted "without justification."[30] These arguments readily are dispelled by the evolution of the proposals in this proceeding, the advocacy of the satellite industry, and the underlying record.

A. The Adopted Rules Afford Far More Certainty and Opportunity than the Rules Proposed in the NPRM

While ViaSat would have preferred that the Commission adopt a full co-primary spectrum sharing solution for the 27.5-28.35 GHz and 37.5-40 GHz band segments, the solution adopted in the *Order* is far more flexible and accommodating than the one proposed in the Notice of Proposed Rulemaking ("NPRM"). The original proposal would have allowed only secondary, non-interference-protected deployment of new earth stations in these band segments unless the licensee won a terrestrial spectrum auction, acquired all or part of a terrestrial wireless license, or made an arrangement with a terrestrial wireless licensee.[31] The entire satellite industry opposed having that approach as the primary way satellite earth stations would be authorized in this spectrum on a going-forward basis.[32]

The Commission fortunately changed course. The *Order* allows the deployment of an earth station on a secondary, non-interference-protected basis. It also allows the deployment of an earth station on a protected basis by: (i) winning a terrestrial spectrum license at auction, (ii) acquiring in the secondary market an entire terrestrial wireless license, (iii) obtaining in the secondary market a partitioned segment of a terrestrial wireless licensee, or (iv) coordinating or

---

29 Boeing Petition at iii, 23; SES/O3b Petition at 9.

30 SES/O3b Petition at 15.

31 *See Spectrum Frontiers Order* at ¶ 48.

32 *See* Comments of the Satellite Industry Association, GN Docket No. 14-177, *et al*., at 13-18 (Jan. 28, 2016) ("SIA Comments").

otherwise entering into a contractual relationship with a terrestrial wireless licensee.[33] Most significantly, the *Order* also allows the deployment of almost 11,000 earth station facilities throughout the nation on a protected basis (expressly including urban areas).[34] Moreover, the Commission grandfathered all earth stations licensed or applied for by the adoption date of the *Order*, thus providing an opportunity to obtain interference-protected licenses for earth stations associated with satellite networks already under development.[35] Furthermore, the Commission provided interference protection to the receivers of the satellite networks associated with interference-protected earth stations.[36]

In other words, the Commission provided a variety of options for authorizing earth station deployment throughout the nation. Satisfying the 0.1 Percent Rule is just one of the options. And the implicit burden associated with that rule is managing earth station deployment to be reasonably compatible with nearby terrestrial facilities—ensuring the operation of the earth station affects "a small percentage (or even none) of the population."[37]

For these reasons, the adoption of the 0.1 Percent Rule offers far greater certainty and opportunity for satellite operators than if the Commission had adopted the NPRM without modification. At the same time the Satellite Petitioners complain that 0.1 Percent Rule does not go far enough, they (i) disregard what they gained during the proceeding—far greater (about

---

33 *Spectrum Frontiers Order* at ¶¶ 58, 92.

34 The *Order* allows for three protected 28 GHz earth stations per county, and three protected 39 GHz earth stations per PEA. There are 3,143 counties and county equivalents in the United States. *See id*. at ¶ 254. There are 416 PEAs. Public Notice, *Wireless Telecommunications Bureau Provides Details About Partial Economic Areas*, DA 14-759 (rel. June 2, 2014).

35 *Spectrum Frontiers Order* at ¶ 59.

36 *See* 47 C.F.R. § 25.202(a)(1) n.7 (protecting FSS operations associated with certain authorized earth stations).

37 *Spectrum Frontiers Order* at ¶ 60.

11,000) opportunities to license a protected earth station, additional grandfathered earth stations, and associated protection of satellite receivers, and (ii) ignore the additional avenues the Commission provided to enable earth station deployment across the nation.

B. The 0.1 Percent Rule Is Based on the Record of the NPRM

To utilize the additional opportunities provided by the 0.1 Percent Rule, a 28 GHz band earth station must be designed and sited such that a clearly-defined amount of RF energy that it actually emits does not cover (i) more than a specified portion of the nearby population, or (ii) a nearby major event venue, arterial street, interstate, U.S. highway, urban mass transit route, passenger railroad, or cruise ship port.[38] The Commission adopted this rule in response to significant advocacy from the satellite industry, and their opposition to the much more limited proposals in the NPRM.

The satellite industry responded to the NPRM by advocating for broader opportunities to deploy earth stations, on a protected basis, and subject to certain technical limits.[39] The satellite industry urged that UMFU and satellite services could operate on a co-primary basis with "clear operating rules."[40] To demonstrate the ability to operate on such a protected basis, satellite operators (i) submitted detailed technical data showing that any necessary separation distances between 28 GHz earth stations and terrestrial mobile stations could be in the range of 160 to 170

---

38 Because the 39 GHz band is used for the reception of satellite signals by earth stations, the portion of the rule related to emitted RF energy does not apply. *See Spectrum Frontiers Order* at Appendix A, § 25.136(b) (to be codified at 47 C.F.R. § 25.136(b)).

39 *See* SIA Comments at 18; SIA *Ex Parte* Letter, GN Docket No. 14-177, *et al*., at 4-5 & n.15 (June 22, 2016) ("SIA June 22 *Ex Parte*").

40 SIA Notice of *Ex Parte*, GN Docket No. 14-177, *et al*., Attach. at 2 (May 10, 2016) ("SIA May 10 *Ex Parte*").

meters (or, according to EchoStar, 60 meters or less),[41] and (ii) explained that pockets of areas likely existed within UMFU coverage areas—even urban areas—where protected earth station operations would not impair UMFU service.[42] Other satellite operators either supported those specific calculations or agreed that any necessary separation zones can be very small.[43] Based on data provided by the satellite industry during meetings about "how to mitigate interference,"[44] AT&T, Nokia, Samsung, T-Mobile, and Verizon estimated that any necessary separation distances could be as small as 200 meters.[45] The Commission acknowledged that these "relatively small protection zones will have little impact on terrestrial use"[46] and wrote the 0.1 Percent Rule to ensure that would be the case.[47]

Whether the Commission developed 0.1 Percent Rule in response to these types of record arguments, or whether that rule is based, as the Satellite Petitioners allege,[48] on an *ex parte*

---

41 *See* ViaSat Comments at 13-14, Ex. 1.; Comments of EchoStar, GN Docket No. 14-177, *et al*., at 16 & n.41 (Jan. 27, 2016) ("For example, using the 5G parameters submitted in this proceeding by Samsung and a conservative path loss model (assuming free space loss plus 20 dB additional discrimination), the required coordination distance between a transmitting gateway and a mobile base station in this band would be approximately 170 meters. If we were instead to use the path loss model assumed by Samsung in its prior submission, *the required coordination distance would be even smaller – approximately 60 meters. These calculations do not include additional mitigation techniques that could be taken to optimize the interference environment for sharing*.") (footnotes omitted, emphasis supplied); *see also Spectrum Frontiers Order* at ¶ 45.

42 *See* ViaSat April 21 *Ex Parte* at 3.

43 *See, e.g.*, Comments of SES Americom, Inc., GN Docket No. 14-177, *et al*., at 14 (Jan. 28, 2016); Comments of O3b Limited, GN Docket No. 14-177, *et al.*, at 17 (Jan. 28, 2016).

44 SIA May 10 *Ex Parte*, Attach. at 6.

45 *Ex Parte* Letter of AT&T, Nokia, Samsung, T-Mobile, Verizon, GN Docket No. 14-177, *et al*., at 4 (May 6, 2016).

46 *Spectrum Frontiers Order* at ¶ 47.

47 *See id.* at ¶¶ 54, 55.

48 *See* EchoStar/Inmarsat Petition at 8, 11; SES/O3b Petition at 3-4.

submitted by Verizon,[49] does not matter. The sharing framework and rules responded to advocacy from the satellite industry for greater flexibility to deploy earth stations than the NPRM otherwise would have provided. In other words, the 0.1 Percent Rule was the logical outgrowth of the NPRM.[50] Interested parties (including a number of the Satellite Petitioners) not only had the chance to, but actually did, comment on the Verizon proposal.[51]

It bears emphasis that the satellite industry argued: "Appropriate rules will ensure that both services can thrive," and some applications "may be more easily accommodated in the 28 GHz band" than other types of applications.[52] In fact, the SIA made a specific counterproposal to Verizon "in the interest of developing a concrete solution to sharing with UMFU operators," which the SIA described as "similar to the approach proposed by Verizon."[53] Both Verizon and

---

49 *Ex Parte* Letter of Verizon, GN Docket No. 14-177, *et al.* at 2 (June 14, 2016) ("Verizon *Ex Parte*").

50 *See, e.g., USTA v. FCC*, 825 F.3d 674, 700 (D.C.Cir. 2016) ("logical outgrowth" test satisfied if NPRM asks for comment on a particular issue or otherwise is clear the agency is contemplating a particular change). The NPRM sought comment on a mechanism that would have allowed earth stations to be protected under a waiver mechanism by which an applicant would demonstrate that "their presence would be unlikely to have a negative impact on future terrestrial service." *See NPRM* at ¶¶ 144-145.

51 *See* SIA June 22 *Ex Parte* at 4-5 & n.15; O3b Notice of *Ex Parte* Presentation, GN Docket No. 14-177, *et al*., at 2-4 (July 4, 2016) ("O3b July 4 *Ex Parte*"); Inmarsat, *Ex Parte* Submission, GN Docket No. 14-177, *et al*., at 4-5 (July 7, 2016) ("Inmarsat July 7 *Ex Parte*").

52 SIA May 10 *Ex Parte,* Attach. at 2.

53 SIA June 22 *Ex Parte* at 4-5 & n.15 ("Verizon acknowledged that it could accept new satellite earth stations in the 28 GHz band if those earth stations are subject to requirements that will protect UMFU operators from interference. One aspect of the proposal restricted new earth station operations to a pfd limit of -77.6 dBm/m^2/MHz at 200 meters from the earth station antenna. *SIA's proposal is similar but will allow the 28 GHz spectrum to be used more efficiently*. . . . SIA recommends a population-weighted density of 1500 people per square mile. *Earth stations would have to demonstrate that the population-weighted density is lower than this threshold over the area where the pfd level from the transmitting earth station is at or above -77.6 dBm/m^2/MHz as measured from a height of 10 meters.*") (footnotes omitted, emphasis supplied). Despite this

the SIA proposed using the same RF level emitted by the earth station, measured at the same height above ground.[54] The main difference was the reference population: (i) Verizon proposed evaluating whether that RF emission covered a certain percentage of population that would limit earth station deployment to "relatively less-densely populated areas," and (ii) the SIA proposed evaluating whether it covered an area with a specified population density.[55]

Against this backdrop, it is not surprising that (i) the Commission adopted different earth station licensing rules than it proposed in the NPRM, (ii) proposals made after the NPRM may have informed the alternative approach that the Commission ultimately adopted, (iii) the Commission struck a balance to "encourage intensive use of the band by both UMFU and FSS,"[56] and (iv) every opportunity for authorizing earth stations that the Commission provided may not work equally well for every application. Moreover, as discussed in the next section, the 0.1 Percent Rule appears to be far more accommodating than the Satellite Petitioners claim.

IV. SATELLITE PETITIONERS MISCONSTRUE THE SHARING FRAMEWORK AND MISAPPLY THE ADOPTED RULES

In arguing for wholesale revisions to the adopted satellite/terrestrial sharing framework and the associated rules, the Satellite Petitioners claim that the 0.1 Percent Rule largely precludes future earth station deployment. They allege that it will be impossible to locate earth stations in desirable locations and also adequately manage the level of emitted RF energy that actually

---

response from the SIA, SES and O3b describe the Verizon proposal as "unsubstantiated." SES/O3b Petition at 4.

54 *Compare* Verizon *Ex Parte* at 1, *with* SIA June 22 *Ex Parte* at 2-4.

55 *Compare* Verizon *Ex Parte* at 2, *with* SIA June 22 *Ex Parte* at 5. Given these similarities between the Verizon proposal and the satellite industry proposal, it is wrong for SES and O3b to claim that the 0.1 Percent Rule is "based on the characteristics of a very specific system that is not representative of the systems to be deployed by the rest of the satellite industry." SES/O3b Petition at 6.

56 *Spectrum Frontiers Order* at ¶ 60.

covers the nearby population or certain specified, nearby wireless service areas.[57] These assertions are wrong for the reasons detailed below.

A. Each Opportunity for Earth Station Licensing Need Not Apply to Every Factual Situation

The Satellite Petitioners' arguments are premised upon the assumption that the 0.1 Percent Rule must accommodate every type of earth station deployment in every situation.[58] That is wrong. The Commission recognized that the 0.1 Percent Rule may not apply in all cases. Should that be the case, earth station licensees can avail themselves of the other opportunities the Commission provided for authorizing earth stations.

It is entirely reasonable and appropriate for the Commission to (i) craft a rule that accommodates earth station deployments that demonstrate an ability to co-exist with terrestrial services, and (ii) accommodate through other means earth station deployments that are less "sharing-friendly." The Commission articulated this very reasoning in adopting the 0.1 Percent Rule.[59] Assuming for the sake of argument that it would not be possible to license certain existing earth stations under the 0.1 Percent Rule, applicants certainly could avail themselves of a variety of other options permitted under the *Order*, ranging from (i) acquiring a terrestrial license at auction, (ii) acquiring an entire or a disaggregated terrestrial license in the secondary

---

57 SES/O3b Petition at 9; EchoStar/Inmarsat Petition at 10 (the Commission "adopted rules that, taken in combination, will preclude deployment of FSS earth stations").

58 *See, e.g.*, SES/O3b Petition at 4 ("Commission rules intended to limit the impact of FSS earth stations on prospective UMFU operations must accommodate, at a minimum, the types of earth stations that are already authorized and operating in the 28 GHz band."); EchoStar/Inmarsat Petition at 15 (describing Hughes Network Systems's facility as one that could not be authorized today).

59 *See Spectrum Frontiers Order* at ¶ 46.

market, (iii) using the terrestrial licenses some of them already hold,[60] or (iv) entering into the type of negotiated coordination arrangement that EchoStar still advocates today.[61]

For these reasons, the Satellite Petitioners are simply mistaken that the 0.1 Percent Rule "seriously and unnecessarily impair[s] the ability of FSS operators to deploy earth stations,"[62] and that it has "the effect of undermining the Commission's stated goals for the future of both 5G and satellite services."[63] Moreover, their analysis of how the 0.1 Percent Rule might apply in certain circumstances does not take into account real-world factors.

B. Applying the 0.1 Percent Rule Requires Information about Actual Technical Characteristics and Site Conditions—Not Worst-Case, Theoretical Modeling

Any application of the 0.1 Percent Rule to a particular set of circumstances must start with the text of the rule itself, which provides for an analysis of whether the "area in which the earth station *generates* a power flux density (PFD), at 10 meters above ground level, of greater than or equal to -77.6 dBm/m^2/MHz" *covers* more than 0.1 percent of the relevant population (considered along with certain previously-licensed earth stations), and "*contain[s]* any major event venue, arterial street, interstate or U.S. highway, urban mass transit route, passenger railroad, or cruise ship port."[64] ViaSat refers to this area actually covered by the specified level of RF energy as the "0.1 Percent Zone."

---

60 By way of example, EchoStar's affiliate, Alta Wireless, Inc. holds the following UMFU licenses in the 28 GHz band: WPOH667 (San Diego), WPOH669 (Phoenix), WPOH670 (Kansas City), and WPOH668 (Cheyenne).

61 EchoStar/Inmarsat Petition at 15 (urging adoption of the "coordination regime" proposed by AT&T and EchoStar); *see also* AT&T/EchoStar *Ex Parte* at Ex. 2.

62 EchoStar/Inmarsat Petition at 11.

63 SES/O3b Petition at i.

64 *Spectrum Frontiers Order* at Appendix A, § 25.136(a)(4)(ii), (iii) (to be codified at 47 C.F.R. § 25.136(a)(4)(ii), (iii)) (emphasis supplied).

The inclusion of the words "generates," "covers," and "contains" in the 0.1 Percent Rule is significant. An evaluation of generated *RF emissions* that *cover* or *contain* the specified area requires either (i) actual licensed parameters, actual transmit antenna patterns, and information about actual physical conditions at the site and the nearby areas, or (iii) other measured data. And, as the Commission recognized throughout the *Order*, those actual conditions can include terrain, and other forms of shielding, whether it already exists, or whether it can be installed to mitigate the potential for interference.[65] ViaSat previously confirmed that shielding and other mitigation techniques can have a very significant impact on the compatibility of an earth station with nearby terrestrial deployment. As reported in a July 7, 2016 *ex parte* presentation, ViaSat's testing showed that a Ka-band gateway-type earth station located on the top of a building *produced no measureable RF emissions on the ground anywhere near the building.*[66]

Thus, nothing in the 0.1 Percent Rule precludes the licensing of earth stations that merely "might infringe"[67] on the nearby area, as EchoStar and Inmarsat claim. Nor does the rule broadly prohibit "placing earth stations near interstates and U.S. highways,"[68] as SES/O3b claim.

In support of their claims that the 0.1 Percent Rule does not work as intended, SES and O3b include illustrations of how the rule would apply to two current earth station sites.[69] As an initial matter, those illustrations are academic, because the SES/O3b earth stations at those

---

65 *See Spectrum Frontiers Order* at ¶ 46 & nn.100, 101, ¶ 55, ¶ 92 & n.220, Appendix C.

66 *See* ViaSat July 7 *Ex Parte* at 11.

67 EchoStar/Inmarsat Petition at 11.

68 SES/O3b Petition at 15.

69 *See id.* at 7-9, 13, Attach. 1 & 2.

locations[70] were licensed before adoption of the *Spectrum Frontiers Order*, and thus are grandfathered. Even more fundamentally, the illustrations appear to be based on theoretical or incomplete modeling that does not take into account information such as actual measured antenna gain toward the horizon, of the effects of terrain. Thus, the illustrations risk significantly misstating even the potential area of RF signal coverage.

The SES/O3b illustration for Woodbine, Maryland depicts a perfect circle around the earth station as its expected coverage of the nearby area.[71] As the Commission well-knows, however, an FSS earth station's actual RF emissions are focused on the satellite with which it communicates, and they "fall off" in other directions.

ViaSat has performed a simulation using a representative antenna pattern for a similar earth station, and taking into account the effects of terrain.[72] That simulation produces a substantially smaller 0.1 Percent Zone than the one SES and O3b depict. This Zone does not cover a single household or any "major event venue, arterial street, interstate or U.S. highway, urban mass transit route, passenger railroad, or cruise ship port."[73]

SES and O3b also provide an illustration of their earth station in Vernon, Texas,[74] which is used in connection with the O3b NGSO satellite system. They do not provide information about the data underlying their illustration, such as whether it factors in the planned launch of

---

70 The SES facility in Woodbine, Maryland was licensed on July 13, 2016 under call sign E160021; the O3b facility in Vernon, Texas was licensed on June 20, 2013 (modification granted on January 22, 2015) under call sign E130021.

71 *See* SES/O3b Petition at Attach. 1.

72 *See* attached Technical Annex at 1-3.

73 *Id.; Spectrum Frontiers Order* at Appendix A, § 25.136(a)(4)(iii) (to be codified at 47 C.F.R. § 25.136(a)(4)(iii)) (emphasis supplied).

74 *See* SES/O3b Petition at 9, Attach. 2.

eight additional O3b spacecraft next year, what elevation angles are assumed (and why), or what antenna gain pattern and EIRP toward the horizon they used.

ViaSat's analysis[75] addresses all of those matters and produces a 0.1 Percent Zone that is significantly smaller than the one SES/O3b calculate. It is very small—about 1.5 km in diameter—and does not cover any households. This appears consistent with the size of the zone the Commission concluded was possible to achieve, and that formed the basis for the current sharing framework and the associated rules.[76] Notably, O3b previously identified changing its transmit elevation angle, reducing its uplink power, and employing shielding, among the means it already has in place to avoid interfering with terrestrial operations in the 28 GHz band.[77]

Since this is a grandfathered facility, ViaSat's analysis does not consider the feasibility of producing a 0.1 Percent Zone that covers a different area. But if this same type of facility were proposed in the future, such as for another O3b gateway in the United States, careful site selection alone would be a way to ensure the Zone does not encompass any major event venue, arterial street, interstate or U.S. highway, urban mass transit route, passenger railroad, or cruise ship port.

V. WHOLESALE REVISIONS TO THE ADOPTED SHARING FRAMEWORK AND RULES ARE UNWARRANTED AND UNNECESSARY

The Satellite Petitioners argue for a wholesale revision to both the sharing framework adopted in the *Order* and the 0.1 Percent Rule, based on their claim that it is now "virtually

---

75 *See* attached Technical Annex at 3-5.

76 *See Spectrum Frontiers Order* at ¶¶ 55, 56.

77 *See* O3b Limited, IBFS File No. SAT-LOI-20141029-00118, Attachment A, Technical Information to Supplement Schedule S, at 33 (filed Oct. 29, 2014) ("O3b is prepared to take necessary technical measures to avoid harmful interference such as adjusting the transmit elevation angles, frequency avoidance, uplink power adjustment, earth station shielding, or some combination thereof.").

impossible" to deploy an earth station near fiber[78] and that the sharing framework and rules do not provide "realistic opportunities" to site new earth stations in the 28 GHz band.[79] Boeing argues for substantial changes to the 0.1 Percent Rule, claiming that the rule does not accommodate "Boeing's overall gateway earth station requirements."[80] More specifically:

- EchoStar and Inmarsat propose that the Commission replace the 0.1 Percent Rule with the type of "keep earth stations out of urban cores" proposal previously made by EchoStar and AT&T.[81]
- SES and O3b propose to replace the 0.1 Percent Rule with a complex three-tiered approach that would (i) "encourage new earth station applicants to locate stations in less densely populated counties"[82] by raising the 0.1 percent threshold and scaling it from 0.2 percent to 10 percent depending on the population of the county in which the earth station would be located,[83] and (ii) in certain cases, measure compliance with the numerical population threshold on a BTA basis, rather than on a county basis.[84]

---

78 *See* SES/O3b Petition at 15 ("fiber is often co-located with highways and railroads . . . in a large portion of the nation, fiber links may be unavailable at earth station sites permitted under the Commission's rules."), at 7 ("the 0.1 percent population figure is so low that an earth station operator cannot site an antenna close to a fiber facility without exceeding the population limit"), at 8 (0.1 Percent Rule "has made it virtually impossible for NGSO earth stations . . . to find any suitable locations"), and at 9 ("the 0.1 percent limit was arbitrarily chosen and effectively makes it impossible to identify new earth station locations in areas that have access to broadband infrastructure"); EchoStar/Inmarsat Petition at 9, 15 (the sharing rules "largely preclude FSS earth stations from reasonable access to fiber and other vital infrastructure" and "materially hinder[] FSS deployment.").

79 SES/O3b Petition at 5.

80 Boeing Petition at 23, 25 ("to locate upwards of 2,800 earth stations in the United States without creating exclusion zones that affected more than 0.1 percent of the total U.S. population. . . . Boeing needed to disregard both the 0.1 percent restriction in rural PEAs and the restriction on three earth stations in each rural PEA."). That satellite network is not yet licensed. Boeing has pending applications for both a 28 GHz network and a 39 GHz network. *See* The Boeing Company, IBFS File Nos. SAT-LOA-20160622-00058 (filed June 22, 2016); SAT-LOA-20161115-00109 (filed Nov. 15, 2016).

81 EchoStar/Inmarsat Petition at ii, 15-20; *see supra* pp. 4, 7-8.

82 SES/O3b Petition at 10.

83 *Id.* at 10-12.

84 *Id.* at 12-13.

- Boeing also proposes to measure the impact of a proposed earth station on nearby UMFU service with respect to the entire population of the United Sates, rather than with respect to the population of the relevant UMFU license area.[85]

As shown above, these proposals are solutions in search of a problem. It is possible to design, site, and operate an earth station that satisfies the 0.1 Percent Rule and thus has a limited impact on the nearby area. Even where that may not be the case, the Commission has provided a number of ways to authorize earth stations *without satisfying the 0.1 Percent Rule.*[86]

Furthermore, it is certainly possible to extend fiber to a planned earth station site. ViaSat's gateway deployment for its spacecraft, which is based on the framework adopted in the *Spectrum Frontiers Order*, may require extending fiber to some earth station sites.[87] The same is likely true for other operators. Thus, the opportunities created by the *Spectrum Frontiers Order* also promise to facilitate the Commission's goal of expanding fiber deployment. The long discussion by the Satellite Petitioners about the obvious relationship of existing fiber deployment to existing roads and rail lines[88] proves nothing that warrants wholesale revisions of the sharing framework adopted in the *Order,* or any of the associated rules.

The EchoStar/Inmarsat proposal to replace the 0.1 Percent Rule is just another attempt to advance the EchoStar/AT&T proposal that the Commission rejected, with good reason, because it would have relegated earth station deployment to rural and remote areas, "provided less

---

85 Boeing Petition at 23-25.

86 *See supra* pp. 9-10, 15-16.

87 The ability to deploy gateways in urban areas and near other population centers under the *Spectrum Frontiers Order* reduces the need to extend fiber, but does not eliminate it.

88 *See* EchoStar/Inmarsat Petition at 9-15; SES/O3b Petition at 15.

predictability regarding the locations of future earth stations," and "limited the ability of FSS to deploy near population centers."[89] EchoStar and Inmarsat provide no answer to that rejection.

Similarly, most of the SES/O3b proposal appears to be a variation of the rejected alternative that O3b proposed before the *Order* was adopted[90] and that O3b made in response to Verizon's proposal to use a 0.1 percent population threshold.[91] Moreover, the SES/O3b sliding scale proposal is not substantiated, and thus appears vulnerable to SES and O3b's very own arguments about the 0.1 Percent Rule.[92]

Both the Boeing and the SES/O3b proposals to alter the reference population for measuring the impact on nearby areas appear to be clever ways to draw much larger "protection zones" around their desired earth station networks. Rather than using the population of the relevant PEA as the reference population for each of its 2,800 planned earth stations in the United States, Boeing would have the Commission measure the aggregate impact of Boeing's entire network against the entire population of the United States.[93] SES and O3b propose that in some UMFU license areas, the reference population should be the entire BTA in which the earth station is located, rather than just the county.[94]

---

89 *Spectrum Frontiers Order* at ¶ 60; *see supra* pp. 4, 7-8.

90 *See* O3b July 4 *Ex Parte* at 1 (proposing that protected earth stations should be licensed with reference to an area with a population-weighted density of 1,500 people or more per square mile, and that NGSO earth stations also should be licensed with reference to an area containing no more than 10 percent of the local population).

91 *See* Verizon *Ex Parte* at 2.

92 SES and O3b characterize the 0.1 percent population threshold in the 0.1 Percent Rule as "arbitrarily chosen." SES/O3b Petition at 9. In fact, as O3b's counterproposal to Verizon reflects, both O3b and the SIA proposed different reference population values, without any more substantiation than Verizon provided. *See supra* p. 13-14 & n.51; O3b July 4 *Ex Parte* at 3-4.

93 *See* Boeing Petition at 24-25.

94 SES/O3b Petition at 12.

Because there are over six times more counties than BTAs in the United States,[95] using a BTA to establish the reference population would allow a given earth station to emit substantially more unwanted energy in a nearby area than the 0.1 Percent Rule otherwise provides, and still receive interference protection. That would likely reduce the number of interference-protected earth stations that could be deployed in the other counties comprising the BTA. Doing so also would undercut the main reason for the 0.1 Percent Rule: enabling the deployment of earth stations throughout the nation, *including urban areas,* and providing satellite operators the opportunity to "greatly expand their operations to over 9,500 locations" in the 28 GHz band.[96]

VI. OTHER CONCERNS CAN BE ADDRESSED ON A CASE-BY-CASE BASIS

ViaSat agrees with SIA's "calling to the Commission's attention" the very limited circumstances where reliance on the 0.1 Percent Rule may produce an untended effect. [97] Namely, in certain cases, it is possible that the 0.1 Percent Zone could cover a very low number of people, but still not satisfy the 0.1 Percent Rule. This could be addressed by the International Bureau determining, under a given set of facts presented in an application, that the resulting RF signal coverage of slightly more than 0.1 percent of the population nevertheless would have a *de minimis* impact. Such a finding could be supported by a showing that the applicant cannot, based on actual antenna patterns, terrain, and shielding, design, deploy or operate an earth station in a manner that satisfies the 0.1 Percent Rule.

---

95 There are 493 BTAs in the United States, and 3,143 counties or county-equivalents. *See Spectrum Frontiers Order* at ¶¶ 19, 254.

96 *Id.* at ¶ 60.

97 *See* Petition for Reconsideration of the Satellite Industry Association, GN Docket No. 14-177, *et al*. at 11 (Dec. 14, 2016).

In this respect, it bears emphasis that the Commission already has directed the International Bureau to "issue a public notice seeking comment on the appropriate methodology to calculate the 0.1 percent population limit and further details regarding earth station interference zone calculation. . . ." [98] There is no reason this type of issue cannot be handled by the International Bureau under its delegated authority, instead of requiring reconsideration by the full Commission. Similarly, the International Bureau is fully empowered to fill in any implementation details left open by the *Order*, such as how it interprets the terms "gateway,"[99] "major event venue," "arterial street," and "urban mass transit routes"[100] when it applies the 0.1 Percent Rule in a given case. As discussed above, even a large 9.1 meter antenna can be deployed in the Washington, D.C./Baltimore metropolitan area without producing a 0.1 Percent Zone that covers any such areas.[101] It would be far better to develop the 0.1 Percent Rule based on actual facts and circumstances, than to discard and rewrite the entire sharing framework in the *Order*, as the Satellite Petitioners suggest.

VII. CONCLUSION

For the reasons provided above, ViaSat urges the Commission to dismiss the reconsideration petitions of EchoStar/Inmarsat and SES/O3b, and also to dismiss Boeing's attempt to fundamentally change how Commission calculates the impact of a proposed earth station on the nearby area. These petitions are solutions in search of a problem.

---

98 *See Spectrum Frontiers Order* at ¶ 54 n.120.

99 *Cf.* SES/O3b Petition at 15-17 (requesting that Commission on reconsideration clarify the meaning of "gateway-type services").

100 *Cf.* EchoStar/Inmarsat Petition at 14-15 (requesting that Commission on reconsideration clarify the meaning of "major event venue," "arterial street," "urban mass transit" and similar terms used in the 0.1 Percent Rule).

101 *See supra* p. 18; *see also* attached Technical Annex at 2.

There simply is no reason to overturn and rewrite the rules for sharing between satellite and terrestrial mobile wireless services in the 27.5-28.35 GHz and 37.5-40 GHz band segments. The rules expressly were intended to enable earth station deployment throughout the nation, *including in urban areas*. Moreover, it is possible to design, site, and operate an earth station in a manner that satisfies the 0.1 Percent Rule, even in rural areas. And it also is possible to deploy such an earth station near fiber. Even in circumstances where that may not be the case, the Commission has provided a number of other ways to authorize earth stations.

Claims that the record does not support the decision, and that the Commission acted arbitrarily and without reasoned analysis, do not bear scrutiny. The record is more than adequate. Moreover, the satellite industry participated in developing the adopted sharing solution and associated rules.

The Satellite Petitioners' complaints about possible application of the rules are based on theoretical models that do not take into account the actual technical parameters of the earth station in question, or real-world factors like terrain that determine how much of the local area the operation of the earth station actually would affect. Other concerns about the application of the rules can be handled by the International Bureau under its delegated authority; they do not require reconsideration of the *Order*.

Respectfully submitted,

/s/

John P. Janka
Elizabeth R. Park
LATHAM & WATKINS LLP
555 Eleventh Street, N.W., Suite 1000
Washington, DC 20004
Counsel for ViaSat, Inc.

Christopher J. Murphy
Associate General Counsel
Regulatory Affairs
VIASAT, INC.
6155 El Camino Real
Carlsbad, CA 92009

January 31, 2017

Technical Annex

This analysis responds to the technical information contained in the Petition for Reconsideration of SES Americom, Inc. ("SES") and O3b Limited ("O3b").[102] In that petition, SES and O3b evaluate the ability of two earth station facilities to be licensed under Section 25.136(a)(4): (i) an earth station located at SES's existing facility in Woodbine, Maryland, and (ii) the existing O3b gateway earth station in Vernon, Texas.[103]

Section 25.136(a)(4) requires an analysis of whether the "area in which the earth station *generates* a power flux density (PFD), at 10 meters above ground level, of greater than or equal to -77.6 dBm/m^2/MHz" *covers* more than 0.1 percent of the relevant population (considered along with certain previously-licensed earth stations), and "*contain[s]* any major event venue, arterial street, interstate or U.S. highway, urban mass transit route, passenger railroad, or cruise ship port."[104] ViaSat calls the area covered by the specified level of RF energy the "0.1 Percent Zone."

Woodbine, Maryland

Because the SES/O3b analysis for Woodbine, Maryland depicts a perfect circle around the earth station as its expected RF "coverage" of the nearby area, it is apparent that SES/O3b are not using actual transmit antenna gain patterns. An FSS earth station's actual RF emissions are focused on the satellite with which it communicates, and antenna gain is substantially reduced in other directions, including on the sides and in the back of the earth station. This is shown in the transmit gain patterns attached as Exhibit 1, which are representative of a 9.1 meter Ka-band

---

102 Petition for Reconsideration of SES Americom, Inc. and O3b Limited, GN Docket No. 14-177, *et al*. (Dec. 14, 2016) ("SES/O3b Petition").

103 SES/O3b Petition at 7, 9, & Attach. 1 & 2.

104 *Spectrum Frontiers Order* at Appendix A, § 25.136(a)(4)(ii), (iii) (to be codified at 47 C.F.R. § 25.136(a)(4)(ii), (iii)) (emphasis supplied).

earth station antenna. There do not appear to be any antenna gain patterns on file for the grandfathered SES 9.1 meter earth station,[105] Call Sign E160021, that SES/O3b reference. The narrative associated with the application for that call sign discusses operating at a nominal 20 degree elevation angle,[106] which is consistent with the antenna being pointed toward SES-15 at 129.15° W.L. SES/O3b assume an EIRP density toward the horizon of 13.4 dBm/MHz (-16.6 dBW/MHz) in addition to 20 dB of signal attenuation.[107] SES/O3b do not appear to have factored in the effects of terrain.

Using the gain of a representative 9.1 meter antenna, and SES/O3b's assumed EIRP density toward the horizon, ViaSat used the Visualyse simulation software to model the expected 0.1 Percent Zone of this SES earth station, with the effects of terrain. ViaSat's analysis produced the following "0.1 Percent Zone" for this particular case.

105 *See* SES/O3b Petition at 7.

106 SES Americom, Inc., IBFS File No. SES-LIC-20160209-001234, Narrative at 5 (filed Feb. 9, 2016).

107 SES/O3b Petition at 8.

There does not appear to be a single household within the 0.1 Percent Zone. Nor does that Zone contain a major event venue, arterial street, interstate or U.S. highway, urban mass transit route, passenger railroad, or cruise ship port.

Vernon, Texas

SES/O3b do not provide information about the data underlying their analysis of Vernon, Texas, Call Sign E130021, such as how many O3b spacecraft are assumed to be operating, what elevation angles are assumed (and why), or what antenna gain pattern and EIRP toward the horizon they used. They do not appear to have factored in the effects of terrain.

ViaSat used the Visualyse simulation software to model the expected 0.1 Percent Zone for this location, with the effects of terrain. This is an academic exercise because E130021 was licensed in January 2015. The purpose of the ViaSat analysis was to estimate the size and location of the 0.1 Percent Zone and compare the results with the SES/O3b analysis, not whether it could be licensed today under new Section 25.136(a)(4).

Since the license for Call Sign E130021 specifies a ViaSat 7.3 meter antenna, ViaSat used the actual transmit antenna gain pattern for that type of antenna. The gain patterns are attached as Exhibit 2. ViaSat used an EIRP density value of 39.97 dBW/4 kHz (the maximum on-axis EIRP density value in the license for the 28 GHz band frequencies in question, less 20 dB of attenuation).[108]

Use of an assumed 20-degree minimum elevation angle is reasonable based on the 20 active O3b spacecraft expected to be operating by 2018.[109] Having more spacecraft, spaced

---

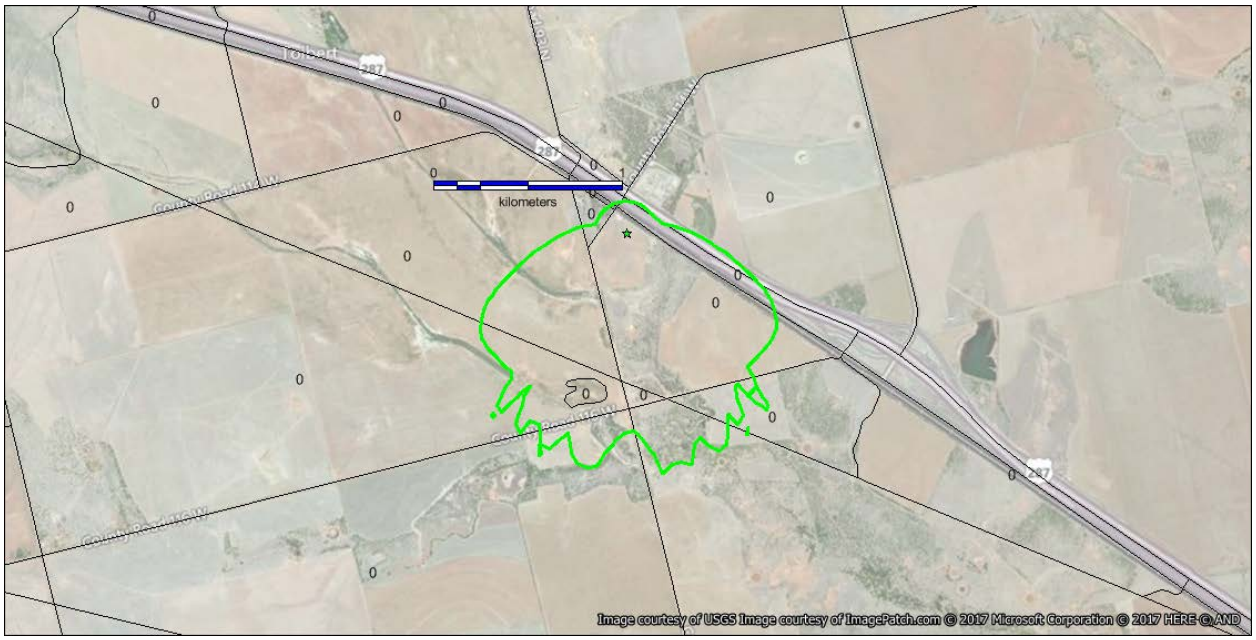
[108] Visualyse calculates the EIRP density toward the horizon automatically based on the antenna pattern in use and the dynamic antenna pointing while tracking the satellites.

[109] O3b Limited, IBFS File No. SAT-MOD-20160624-00060, Attachment A, Technical Information to Supplement Schedule S, at A1-1 (filed June 24, 2016).

closer to each other,[110] will enable SES/O3b to hand off traffic differently, and allow it to operate at even higher elevation angles, than it may be able to do today. The additional gateway earth stations also planned,[111] will provide even more flexibility. These types of operational measures are what O3b indicates it uses with other satellite networks to manage interference.[112]

O3b also has identified changing its transmit elevation angle, and also reducing its uplink power, as operational means it already has in place to avoid interfering with terrestrial operations.[113] ViaSat has not specifically modeled the effects of reducing uplink power below the maximum licensed level specified above.

ViaSat's analysis produced the following "0.1 Percent Zone" for this particular case.



110 *Id.* at A1-2, A1-3.

111 O3b Limited, IBFS File No. SAT-LOI-20141029-00118, Attachment A, Technical Information to Supplement Schedule S, at 37 (filed Oct. 29, 2014).

112 *See id.* at 37.

113 *See id.*, Narrative at 10; Attachment A, Technical Information to Supplement Schedule S at 33 ("O3b is prepared to take necessary technical measures to avoid harmful interference such as adjusting the transmit elevation angles, frequency avoidance, uplink power adjustment, earth station shielding, or some combination thereof.").

ViaSat calculates this area—roughly 1.5 km in diameter—as containing no households.

As noted above, this analysis assumes that 20 dB of shielding or other mitigation techniques have been employed, which O3b already contemplates using.[114] If this same type of facility were proposed in the future, careful site selection also could ensure the Zone does not encompass any major event venue, arterial street, interstate or U.S. highway, urban mass transit route, passenger railroad, or cruise ship port.

[114] *See id.; see also Spectrum Frontiers Order* at ¶ 46 & nn.100, 101; ¶ 55; ¶ 92 & n.220, Appendix C

DECLARATION

I hereby declare that I am the technically qualified person responsible for preparation of the engineering information contained in this Opposition of ViaSat, Inc. ("Opposition"), that I am familiar with Part 25 of the Commission's rules, that I have either prepared or reviewed the engineering information submitted with this Opposition, and that it is complete and accurate to the best of my knowledge, information and belief.

Daryl T. Hunter, P.E.
Senior Director, Regulatory Affairs
ViaSat, Inc.
6155 El Camino Real
Carlsbad, CA 92009

January 31, 2017

CERTIFICATE OF SERVICE

I, Kayla Ernst, hereby certify that on this 31st day of January, 2017, I served a true copy of the foregoing Opposition of ViaSat, Inc. via first-class mail upon the following:

Chris Pearson
President
5G AMERICAS
1750 112th Avenue N.E., Suite B220
Bellevue, WA 98004

Giselle Creeser
M. Ethan Lucarelli
INMARSAT, INC.
1101 Connecticut Ave. N.W., Suite 1200
Washington, D.C. 20036

Brian M. Josef
Thomas C. Power
Scott K. Bergmann
John A. Marinho
CTIA
1400 16th Street, NW, Suite 600
Washington, DC 20036

Jennifer A. Manner
Jodi Goldberg
Brennan Price
ECHOSTAR SATELLITE OPERATING CORPORATION
HUGHES NETWORK SYSTEMS, LLC
11717 Exploration Lane
Germantown, MD 20876

Steven K. Berry
Rebecca Murphy Thompson
Elizabeth Barket
COMPETITIVE CARRIERS ASSOCIATION
805 15th Street NW, Suite 401
Washington, DC 20005

Rick Chessen
Danielle J. Piñeres
NCTA – THE INTERNET & TELEVISION ASSOCIATION
25 Massachusetts Avenue, NW, Suite 100
Washington, DC 20001-1431

Michele C. Farquhar
Tom Peters
Arpan A. Sura
C. Sean Spivey
HOGAN LOVELLS US LLP
555 Thirteenth Street, N.W.
Washington, DC 20004

Counsel to Nextlink Wireless, LLC

Donald L. Herman, Jr.
Clare C. Liedquist
HERMAN & WHITEAKER, LLC
6720B Rockledge Drive, Suite 150
Bethesda, MD 20817

Counsel to Adams Telcom Inc., Central Texas Communications, Inc., E.N.M.R. Telephone Cooperative, Louisiana Competitive Telecommunications, Inc., Pine Belt Communications, Inc. ("Rural LMDS Licensees")

Petra Vorwig
Senior Legal and Regulatory Counsel
SES AMERICOM, INC.
1129 20th Street, NW, Suite 1000
Washington, DC 20036

Suzanne Malloy
Vice President, Regulatory Affairs
O3B LIMITED
900 17th Street, NW, Suite 300
Washington, DC 20006

James Reid
Dileep Srihari
TELECOMMUNICATIONS INDUSTRY ASSOCIATION
1320 North Courthouse Road, Suite 200
Arlington, VA 22201

Bruce A. Olcott
Preston N. Thomas
JONES DAY
51 Louisiana Ave. NW
Washington, D.C. 20001

Counsel to The Boeing Company

Tom Stroup
President
SATELLITE INDUSTRY ASSOCIATION
1200 18th Street N.W., Suite 1001
Washington, D.C. 20036

Audrey L. Allison
Senior Director, Frequency Management Services
THE BOEING COMPANY
929 Long Bridge Drive
Arlington, VA 22202

Steve B. Sharkey
John Hunter
Christopher Wieczorek
T-MOBILE USA, INC.
601 Pennsylvania Avenue, N.W., Suite 800
Washington, DC 20004

/s/
Kayla Ernst, Paralegal